

Please check that this question paper contains_09_questions and _02_ printed pages within first ten minutes.

[Total No. of Questions:09]

EVENING

[Total No. of Pages: 02]

Uni. Roll No.

27 JUN 2022

Program: B.Tech. (Batch 2018 onward)

Semester: 4

Name of Subject: Electromagnetic Field Theory

Subject Code: PCEC-108

Paper ID: 16224

Time Allowed: 03 Hours

Max. Marks: 60

NOTE:

- 1) Parts A and B are compulsory
- 2) Part-C has Two Questions Q8 and Q9. Both are compulsory, but with internal choice
- 3) Any missing data may be assumed appropriately

Part – A

[Marks: 02 each]

Q1.

- a) Discuss the types of transmission lines briefly
- b) Summarise Maxwell's equations in differential form along with their analogous integral form.
- c) List the various types of waveguides. Which waveguide is most preferred and why?
- d) Illustrate the term dominant mode with some example.
- e) If a wave of 7 GHz propagates between two parallel conducting plates separated by 6 cm. Check whether TE_2 mode propagates or not
- f) Prove that E and H components of electromagnetic wave are perpendicular to each other

Part – B

[Marks: 04 each]

- Q2.** Differentiate between conduction current and displacement current
- Q3.** "TEM wave does not exist in hollow wave guides" Justify.
- Q4.** Discuss the characteristics of Transverse Electric (TE) waves
- Q5.** Prove that the tangential component of magnetic field H is continuous across a surface except at surface of a perfect conductor.
- Q6.** State and Prove Poynting theorem

- Q7. Show that the velocity of wave propagation in transmission line is equal to velocity of TEM wave and is independent of geometry factor

Part – C

[Marks: 12 each]

- Q8. a) Enumerate the advantages of circular waveguides. Why are they generally avoided?

(6 marks)

- b) Define attenuation factor and Quality factor for waveguides. Mention the uses of high quality factor

(6 marks)

OR

- a) Discuss the various parameters of lossless transmission lines

(6 marks)

- b) Discuss how can distortionless condition be achieved on the transmission line?

(6 marks)

- Q9. a) Derive the expression for reflection coefficient in terms of electric strength for reflection of waves by a perfect insulator.

(6 marks)

- b) A parallel polarised wave propagates from air into dielectric at brewster angle of 75° , Calculate the relative dielectric constant of the medium

(6 marks)

OR

- a) Derive the relation between phase velocity, group velocity and free space velocity for wave propagation between parallel planes.

(6 marks)

- b) If a wave of 8 GHz is propagating between parallel conducting plates separated by 4 cm, find the cut-off wavelength, free space wavelength and guide wavelength for TM_1 mode

(6 marks)
